

MillLine

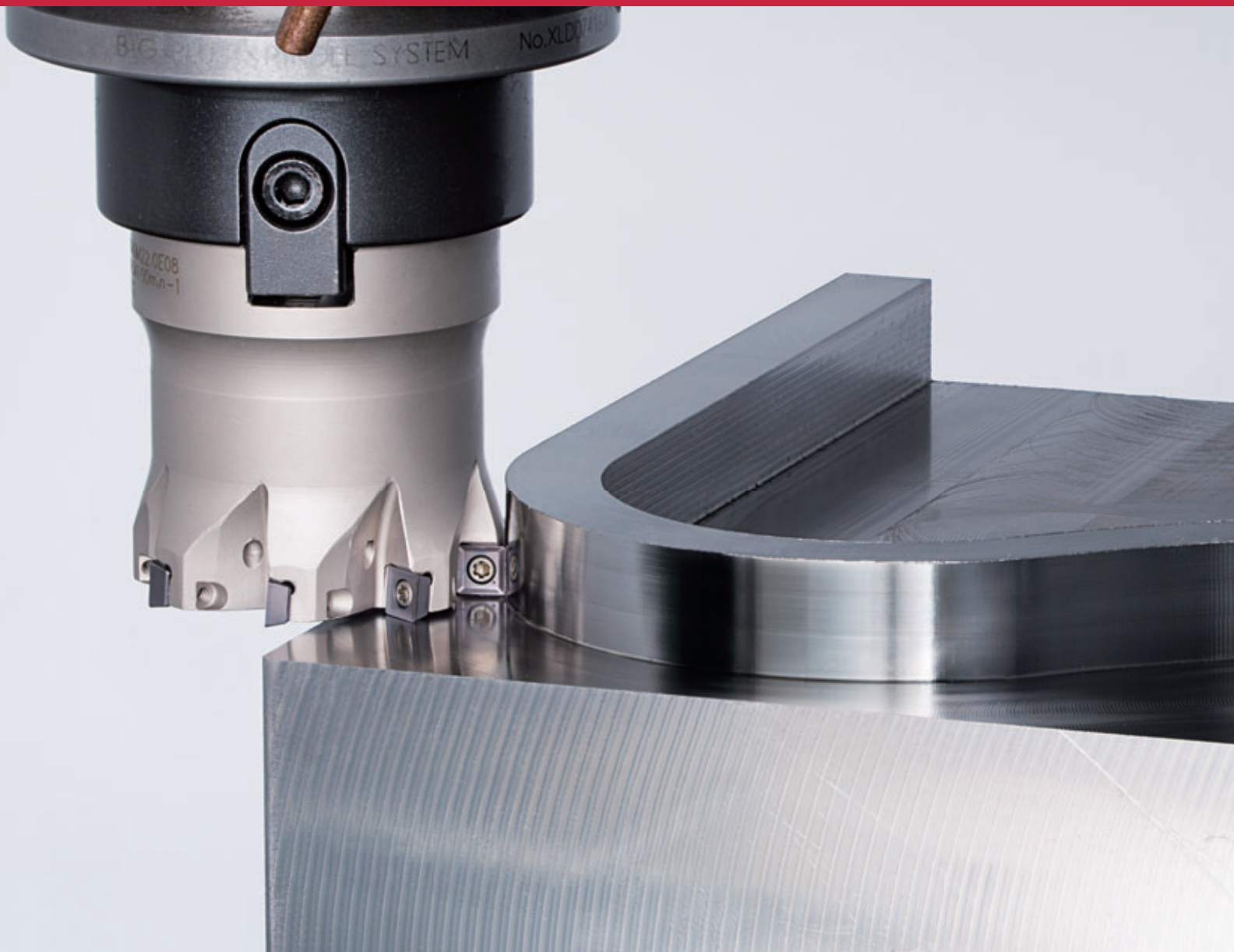
TUNGQUAD

www.tungaloyamerica.com

Tungaloy Report No. 379-US

TUNGQUAD

Stay competitive in small part milling



Member IMC Group
Tungaloy



ACCELERATED MACHINING



**High density shoulder mill for
outstanding performance in small machines**

Perfect shoulder mill for small part machining

High insert density for maximum productivity

A small diameter square shoulder mill with close-pitched insert orientation enables a high product output in various materials.

Number of inserts per cutter diameter

Tool diameter ϕD_c (in)	1.000	1.250	1.500
TUNGQUAD	5	6	8
Conventional	4	5	6
Competitor	3	4	5



Through-coolant

To improve chip controllability

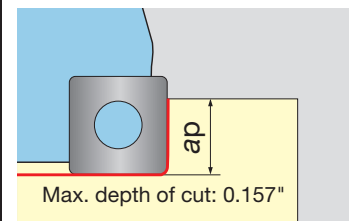
Nickel-plated body

The coated surface protects the tool from wear and corrosion

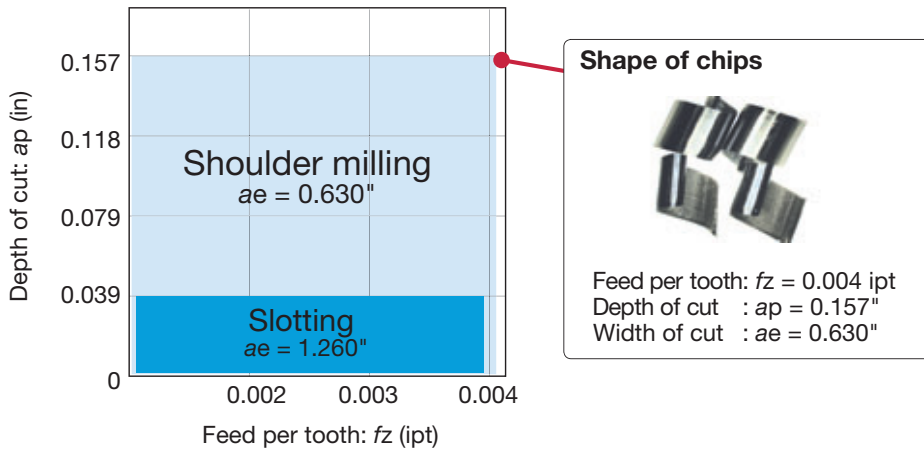
Optimized insert geometry

The cutter carries four-edged, positive inserts with light cutting geometry in combination with high performance grades. Smooth chip control, resulting from free-cutting geometry, assures high stability and productivity in small part milling on a less rigid machine tool.

Chipbreakers	Work material	Shape	Features	Cross-sections of the cutting edge (Outline figure)
MJ	P M K Steel Stainless Cast Iron		Well balanced sharpness and strength	
AJ	N Non-ferrous		Sharp edge and lapped surface	

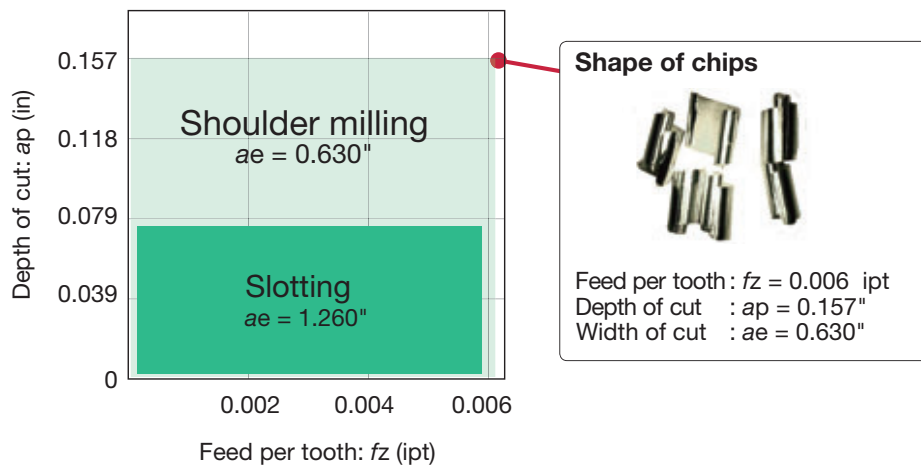


- Application range for steel, 1055



Cutter : EPD05R125U0100W06 ($\phi 1.250"$)
 Insert : SDMT050204PN-MJ
 Grade : AH725
 Cutting speed : $V_c = 591$ sfm
 Cutting fluid : Dry cutting
 Machine : Vertical M/C, CAT30

- Application range for aluminum, 7020

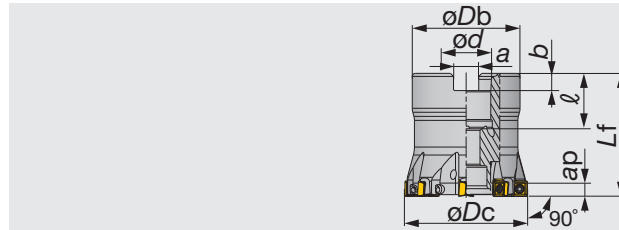


Cutter : EPD05R125U0100W06 ($\phi 1.250"$)
 Insert : SDHT050204FN-AJ
 Grade : TH10
 Cutting speed : $V_c = 1312$ sfm
 Cutting fluid : Dry cutting
 Machine : Vertical M/C, CAT30

TPD05

Highly dense square shoulder mills with small SDMT/SDHT05 inserts

A.R. = +5°, R.R. = -7° ~ +12°



Right hand (R) shown.

Inch	Max. a_p	ϕDc	z	ϕDb	L_f	ϕd	ℓ	a	b	l_b	Air hole	Insert
TPD05R150U0075A08	0.157	1.500	8	1.461	1.570	0.750	0.750	0.313	0.170	0.220	with	SD*T0502...
TPD05R200U0075A10	0.157	2.000	10	1.750	1.570	0.750	0.750	0.313	0.170	0.440	with	SD*T0502...

SPARE PARTS

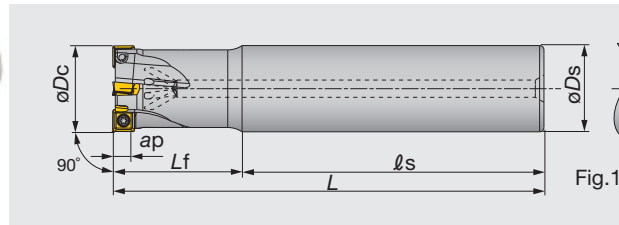


Designation	Clamping screw	Wrench	Center bolt (Optional parts)
TPD05...	CSPB-2L043	IP-6DB	(C0.375X1.125H)

EPD05

Highly dense square shoulder endmills with small SDMT/SDHT05 inserts

A.R. = +5°, R.R. = -7° ~ +12°



Right hand (R) shown.

Inch	Max. a_p	ϕDc	z	ϕDs	ℓ_s	L_f	L	l_b	Air hole	Shank	Insert	Shank type
EPD05R050U0050-02	0.157	0.500	2	0.500	1.780	1.220	3.000	0.220	with	Straight	SD*T0502...	Fig.1
EPD05R063U0063-03	0.157	0.625	3	0.625	2.000	1.500	3.500	0.440	with	Straight	SD*T0502...	Fig.1
EPD05R075U0075W04	0.157	0.750	4	0.750	2.030	1.720	3.750	0.440	with	Weldon	SD*T0502...	Fig.2
EPD05R100U0100W05	0.157	1.000	5	1.000	2.280	1.720	4.000	0.660	with	Weldon	SD*T0502...	Fig.2
EPD05R125U0100W06	0.157	1.250	6	1.250	2.280	1.720	4.000	1.100	with	Weldon	SD*T0502...	Fig.2

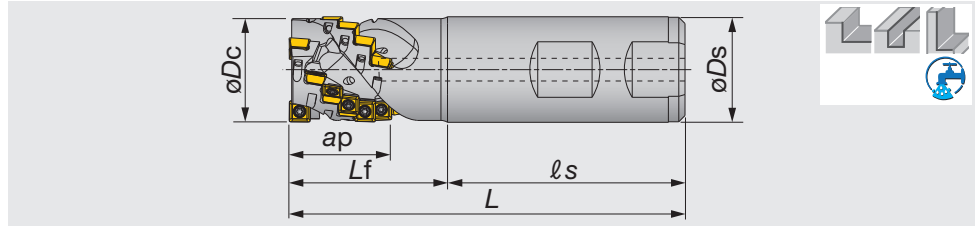
SPARE PARTS



Designation	Clamping screw	Wrench
EPD05...	CSPB-2L043	IP-6DB

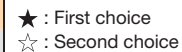
100

A.R. = $+5^\circ$, R.R. = -3°



100

SDMT05-MJ



● : Line up

New

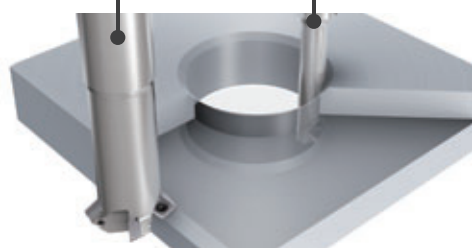
Versatile chamfering cutter

TungQuad now offers a chamfering cutter family, which allows the same cutter to handle multiple types of operations like front-/back-chamfering and counter-sinking of holes or along the edges. (For the cutting parameter recommendations, see page 11 and 12.)

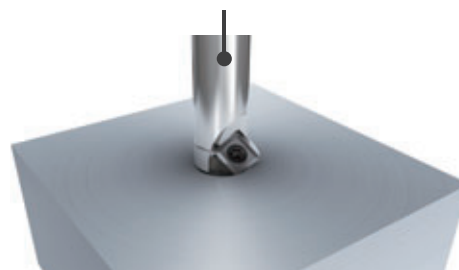
- Minimum workable diameters are $\varnothing 0.236"$ for front chamfering and $\varnothing 0.492"$ for back-chamfering
- Existing SD*T050204 TungQuad inserts are mountable on the cutter, utilizing the insert's free-cutting capability
- Grades available in: AH725, AH140, and TH10

Interpolated chamfering

Back chamfering



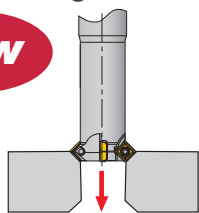
Chamfering & countersinking



CUTTING PERFORMANCE

Chamfering & countersinking

New



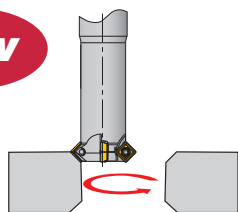
■ For C2.5 (45° x 0.098")

Workpiece material: 1055

Designation	Cutting speed Vc (sfm)	Feed rate fz (ipt)
EAD05R006M12.0-01	262 - 394	0.001 - 0.003
EAD05R008M12.0-02	262 - 394	0.001 - 0.003
EASD05M016C16.0R04 (*z=2)	262 - 394	0.001 - 0.003

Interpolated chamfering

New



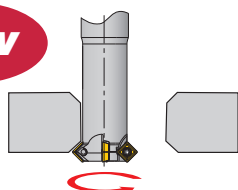
■ For C2.5 (45° x 0.098")

Workpiece material: 1055

Designation	Cutting speed Vc (sfm)	Feed rate fz (ipt)
EAD05R006M12.0-01	262 - 394	0.003 - 0.005
EAD05R008M12.0-02	262 - 394	0.003 - 0.005
EASD05M016C16.0R04	262 - 394	0.003 - 0.005

Back chamfering

New



■ For C1.0 (45° x 0.039")

Workpiece material: 1055

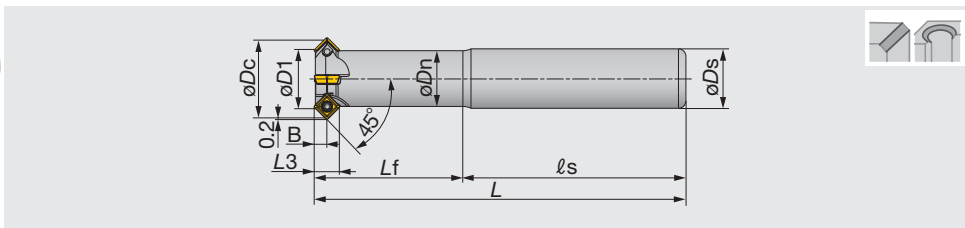
Designation	Cutting speed Vc (sfm)	Feed rate fz (ipt)
EAD05R006M12.0-01	262 - 394	0.003 - 0.005
EAD05R008M12.0-02	262 - 394	0.003 - 0.005
EASD05M016C16.0R04	262 - 394	0.003 - 0.005

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Chamfering endmills with SDMT/SDHT05 inserts



New



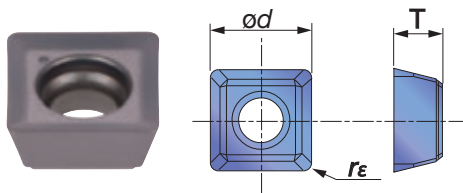
Metric	ϕDc	z	$\phi D1^*$	ϕDn	B	ϕDs	Lf	L3	ℓs	L	Insert
EASD05M006C12.0R01	12(0.472")	1	5.7(0.224")	7.5(0.295")	3(0.118")	12(0.472")	25(0.984")	6.8(0.268")	70(2.756")	95(3.740")	SD*T0502...
EASD05M008C12.0R02	14(0.551")	2	7.8(0.307")	10.6(0.417")	3(0.118")	12(0.472")	40(1.575")	6.8(0.268")	70(2.756")	110(4.331")	SD*T0502...
EASD05M016C16.0R04	22(0.866")	4	15.8(0.622")	15(0.591")	3(0.118")	16(0.630")	50(1.969")	6.8(0.268")	70(2.756")	120(4.724")	SD*T0502...

* The minimum chamfering diameter ($D1$) measures up to the point where the insert's nose radius ends. This will offset the total tool length by shortening 0.012" .

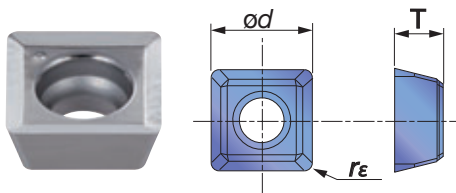


Designation	Clamping screw	Wrench
EASD05...	CSPB-2L043	IP-6DB

SDMT05-MJ



SDHT05-AJ

[illegible]

● : Line up

STANDARD CUTTING CONDITIONS

■ Bore, shank type TPD05/EPD05

ISO	Workpiece material	Brinell hardness HB	Grade	Cutting speed Vc (sfm)	Feed per tooth z (ipt)
P	Low carbon steel (1018, 1020, 1026, etc.)	- 200	AH725	750 - 1050	0.0015 - 0.004
	High carbon steel (1045, 1055, etc.)	200 - 300	AH725	500 - 750	0.0015 - 0.004
	Alloyed steel (4140, 8620, etc.)	150 - 300	AH725	500 - 750	0.0015 - 0.004
	Tool steel (W1-8, etc.)	- 300	AH725	350 - 440	0.001 - 0.0035
M	Stainless steel (304SS, 316SS, 17-4 PH, etc.)	-	AH140	330 - 650	0.001 - 0.0035
K	Gray cast iron (Class 25, Class 30, etc.)	150 - 250	AH725	500 - 820	0.002 - 0.005
	Ductile cast iron (60-40-18, 60-55-06, etc.)	150 - 250	AH725	330 - 590	0.002 - 0.005
N	Aluminum alloys (Si < 13%)	-	TH10	1150 - 1600	0.002 - 0.006
	Aluminum alloys (Si ≥ 13%)	-	TH10	330 - 650	0.002 - 0.006

* For deep and wide cutting, set the Vc and fz to the lower recommended limits and check the vibration and spindle load of the machine.

■ Roughing type ELD05

ISO	Workpiece material	Brinell hardness HB	Grade	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Low carbon steel (1018, 1020, 1026, etc.)	- 200	AH725	330 - 820	0.0015 - 0.004
	High carbon steel (1045, 1055, etc.)	200 - 300	AH725	330 - 660	0.0015 - 0.004
	Alloyed steel (4140, 8620, etc.)	150 - 300	AH725	330 - 660	0.0015 - 0.004
	Tool steel (W1-8, etc.)	- 300	AH725	330 - 400	0.0012 - 0.0035
M	Stainless steel (304SS, 316SS, 17-4 PH, etc.)	-	AH140	300 - 500	0.0012 - 0.0035
K	Gray cast iron (Class 25, Class 30, etc.)	150 - 250	AH725	330 - 820	0.002 - 0.005
	Ductile cast iron (60-40-18, 60-55-06, etc.)	150 - 250	AH725	260 - 660	0.002 - 0.005
N	Aluminum alloys (Si < 13%)	-	TH10	660 - 1650	0.002 - 0.006
	Aluminum alloys (Si ≥ 13%)	-	TH10	330 - 650	0.002 - 0.006

STANDARD CUTTING CONDITIONS

New

■ Interpolated or back chamfering type

ISO	Workpiece material	Grade	Cutting speed Vc (sfm)	Feed per tooth z (ipt)
P	Low carbon steel (1018, 1020, 1026, etc.)	AH725	755 - 1050	0.002 - 0.004
	High carbon steel (1045, 1055, etc.)	AH725	492 - 755	0.002 - 0.004
	Alloyed steel (4140, 8620, etc.)	AH725	492 - 755	0.002 - 0.004
	Tool steel (W1-8, etc.)	AH725	361 - 427	0.001 - 0.004
M	Stainless steel (304SS, 316SS, 17-4 PH, etc.)	AH140	328 - 656	0.001 - 0.004
K	Gray cast iron (Class 25, Class 30, etc.)	AH725	492 - 820	0.002 - 0.005
	Ductile cast iron (60-40-18, 60-55-06, etc.)	AH725	328 - 591	0.002 - 0.005
N	Aluminum alloys (Si < 13%)	TH10	1148 - 1640	0.002 - 0.006
	Aluminum alloys (Si ≥ 13%)	TH10	328 - 656	0.002 - 0.006

New

■ Front chamfering type

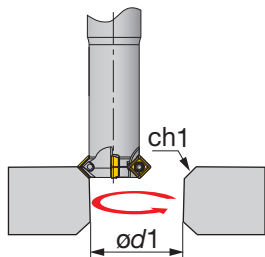
ISO	Workpiece material	Grade	Cutting speed Vc (sfm)	Feed per tooth z (ipt)
P	Low carbon steel (1018, 1020, 1026, etc.)	AH725	525 - 722	0.002 - 0.004
	High carbon steel (1045, 1055, etc.)	AH725	361 - 525	0.002 - 0.004
	Alloyed steel (4140, 8620, etc.)	AH725	361 - 525	0.002 - 0.004
	Tool steel (W1-8, etc.)	AH725	262 - 295	0.001 - 0.004
M	Stainless steel (304SS, 316SS, 17-4 PH, etc.)	AH140	230 - 459	0.001 - 0.004
K	Gray cast iron (Class 25, Class 30, etc.)	AH725	361 - 591	0.002 - 0.005
	Ductile cast iron (60-40-18, 60-55-06, etc.)	AH725	230 - 427	0.002 - 0.005
N	Aluminum alloys (Si < 13%)	TH10	820 - 1148	0.002 - 0.006
	Aluminum alloys (Si ≥ 13%)	TH10	230 - 459	0.002 - 0.006

* When chamfering over C1.0 (45° x 0.039"), decrease the cutting parameters to 70% of the above parameters.

APPLICATION RANGE

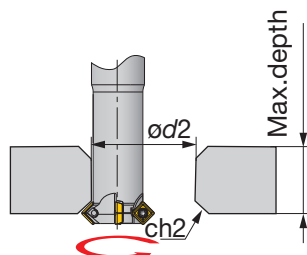
New

Front chamfering



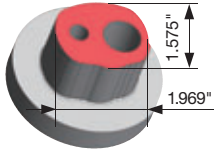
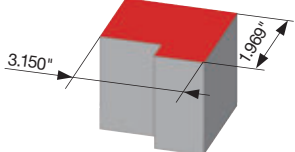
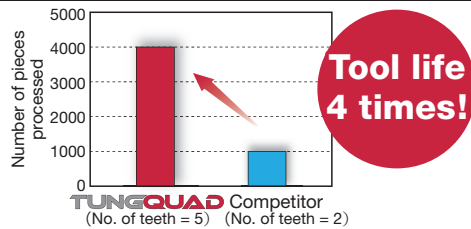
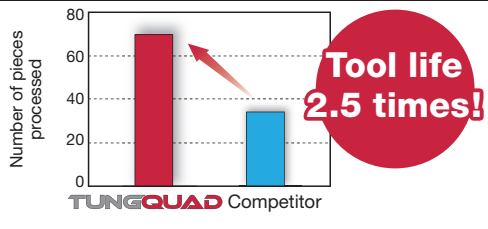
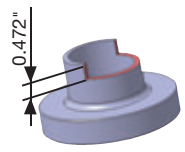
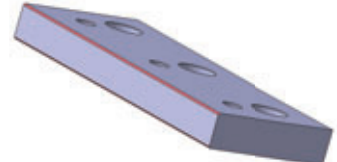
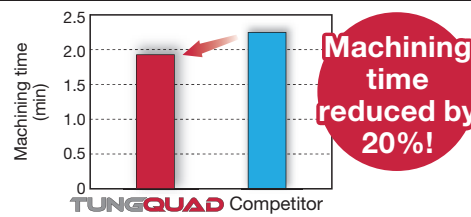
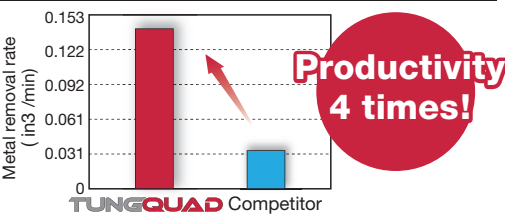
New

Back chamfering



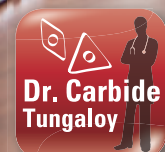
Designation	Minimum hole diameter to be chamfered (in)		Maximum chamfer dimension (at 45°) (in)		Maximum reachable hole distance when back chamfering (in)
	Front-chamfer ød1	Back-chamfer ød2	Front ch1	Back ch2	Max. depth
EASD05M006C12.0R01	0.224	0.492	0.114 x 0.114	0.079 x 0.079	0.717
EASD05M008C12.0R02	0.307	0.571	0.114 x 0.114	0.059 x 0.059	1.307
EASD05M016C16.0R04	0.622	0.886	0.114 x 0.114	0.110 x 0.110	1.701

PRACTICAL EXAMPLES

Workpiece type		Compressor parts	Machine parts
Cutter		EPD05R100U0100W05 ($\phi 1.000"$, $z = 5$)	EPD05R125U0100W06 ($\phi 1.250"$, $z = 6$)
Insert		SDHT050204FN-AJ	SDMT050204PN-MJ
Grade		TH10	AH140
Workpiece material		Aluminum alloys	Stainless steels S30400
		 N	 M
Cutting conditions	Cutting speed : V_c (sfm)	1030	492
	Feed per tooth : f_z (ipt)	0.003	0.002
	Feed speed : V_f (ipm)	59.055	18.036
	Depth of cut : a_p (in)	0.039	0.138
	Width of cut : a_e (in)	0.984	0.079
	Method of machining	Shoulder milling	Shoulder milling
	Coolant	Wet	Dry
	Machine	CAT30	CAT40
Results		 Tool life 4 times! Productivity is Doubled! (Feed speed $V_f = 27.559$ ipm $\rightarrow$ 59.055 ipm)	 Tool life 2.5 times! No chipping on the edge. Stable machining.
Workpiece type		Cover of machine	Plate
Cutter		ELD05R075U0075W02 ($\phi 0.75"$, $z = 2$)	EASD05M016C16.0R04 ($\phi 0.866"$, $z = 4$)
Insert		SDMT050204PN-MJ	SDMT050204PN-MJ
Grade		AH725	AH725
Workpiece material		4140(H)	Low carbon steel
		 P	 P
Cutting conditions	Cutting speed : V_c (sfm)	328	328
	Feed per tooth : f_z (ipt)	0.003	0.004
	Feed speed : V_f (ipm)	9.055	22.835
	Depth of cut : a_p (in)	0.472	0.079
	Width of cut : a_e (in)	6 x 3 passes	0.079
	Method of machining	Shoulder milling	Chamfering along the edge
	Coolant	Wet	Dry
	Machine	Multi-axis machine CAT40	Vertical M/C, CAT40
Results		 Machining time reduced by 20%! Higher productivity achieved than with competitor's solid end mills. Reduction of inventory due to the reduction of regrinding costs.	 Productivity 4 times! The number of the TungQuad inserts is four times the competitor's cutter. The MRR was therefore four times higher.

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